Claims

1. A drug carrier system comprising a plurality of colloidal particles having a core and a shell, said particles comprising copolymer molecules, which copolymer comprises at least one A block and at least one B block different from the at least one A block, wherein the at least one A block consists of a polymer unit of a first set of monomers and the at least one B block consists of a second set of monomers, characterized in that the first set of monomers and the second set of monomers are selected in such a way that polymers only consisting of monomers of the first set and polymers only consisting of monomers of the second set are capable of forming an aqueous two-phase system, and in that the A blocks in particles form the core and the B blocks in the particles form the shell.

2. The drug carrier system of claim 1, wherein said particles comprises a micellar structure.

3. The drug carrier system of claim 1 or 2, having intermolecular crosslinks between at least some of the A blocks in the same particle.

4. The drug carrier system of claim 1, 2 or 3, having intermolecular crosslinks between at least some of the B blocks in the same particle.

5. The drug carrier system of any one of the preceding claims, further comprising a polymer consisting of monomers of the first set.

6. The drug carrier system of claim 5, having intermolecular crosslinks between at least some of the A blocks and at least some of the

chains of the polymer consisting of monomers of the first set in the same particle.

7. The drug carrier system according to any one of the preceding claims, wherein the A block has a biodegradable backbone.

8. The drug carrier system according to claim 3 or claim 6, having biodegradable spacers between block A and at least some of the intermolecular crosslinks.

9. The drug carrier system of claim 8, wherein the biodegradable spacers comprise a hydrolysable ester bond, a hydrolysable amide bond, or a hydrolysable carbonate bond.

10. The drug carrier system according to any one of the preceding claims, wherein the A block consists of a polymer unit of saccharides or derivatives thereof.

11. The drug carrier system according to claim 10, wherein the saccharide is a dextran, optionally modified with an acrylic, a methacrylic or a hydroxyethylmethacrylic group.

12. The drug carrier system according to any one of the preceding claims, wherein the B block consists of a polymer unit of ethylene glycols.

13. The drug carrier system according to any one of the preceding claims, wherein the colloidal particles are substantially insoluble in an aqueous liquid at physiological conditions.

14. The drug carrier system according to any one of the preceding claims, wherein the colloidal particles have a mean particle size of between 5 nm and 50 μm.

15. The drug carrier system according to any one of the preceding claims, further comprising an active ingredient and preferably a pharmaceutically active ingredient.

16. A pharmaceutical composition comprising the colloidal drug carrier system according to any one of the preceding claims.

17. A block copolymer comprising at least one A block and at least one B block different from the at least one A block, wherein the at least one A block consists of a polymer unit of a first set of monomers and the at least one B block consists of a second set of monomers, characterized in that the first set of monomers and the second set of monomers are selected in such a way that polymers only consisting of monomers of the first set and polymers only consisting of monomers of the second set are capable of forming an aqueous two-phase system, and wherein the at least one A block comprises one or more crosslinkable groups.

18. The copolymer according to claim 16, having the structure A-B or A-B-A.

19. The copolymer of claim 17 or 18, wherein the A block possesses a biodegradable backbone.

20. The copolymer according to any one of claims 17-19, wherein a biodegradable spacer is present between the A block and at least some of the crosslinkable groups.

21. The copolymer of claim 20, wherein the biodegradable spacer comprises a hydrolysable ester bond, a hydrolysable amide bond, or a hydrolysable carbonate bond.

22. The copolymer according to any one of claims 17-21, wherein the A block consists of a block selected from the group consisting of native polysaccharides, modified polysaccharides, polyalkylene oxides, polyalkylene glycols, polyvinyl alcohol, polyvinylpyrrolidone, and proteins.

23. The copolymer of claim 22, wherein A block is comprised of dextran units, optionally modified with acrylic, methacrylic or hydroxyethylmethacrylic groups.

24. The copolymer according to any one of the claims 17-23, wherein the B block is a polyethylene glycol block.

25. The copolymer according to any one of the claims 17-24, further comprising at least one block C which is different from the A block and the B block.

26. The copolymer according to any one of the claims 17-25, wherein the B block further comprises a ligand, such as a target-recognizing peptide, protein, antibody, or carbohydrate.

27. Use of the copolymer according to any one of claims 17-26 as a stabilizer of an aqueous two-phase system.

28. Use of the copolymer according to any one of claims 17-27 as a micelle forming agent in an aqueous system.

29. An aqueous composition comprising the copolymer according to any one of claims 17-26.

30. The composition of claim 28 wherein polymers consisting of monomers of the first set and polymers consisting of monomers of the second set are present in an amount effecting a phase separation between a first aqueous phase rich in polymers consisting of monomers of the first set and a second aqueous phase rich in polymers consisting of monomers of the second set.

31. The composition of claim 30, wherein the second aqueous phase forms the continuous phase of the two-phase system.

32. Method for the preparation of a drug carrier system comprising a plurality of colloidal particles, said method comprising the steps of:

(a) preparing an aqueous colloidal solution comprising micelles, said micelles being comprised of a block copolymer according to any one of claims 16-25; and

(b) crosslinking at least some of the crosslinkable groups; wherein step (b) is carried out after step (a).

33. The method of claim 32, wherein step (b) is carried out in the presence of an active substance.

34. Method for the preparation of a drug carrier system comprising a plurality of colloidal particles, said method comprising the steps of:

(a) preparing an aqueous two-phase system, said system comprising:

(aa) block copolymer according to any one of claims 16-25;

(bb) polymer consisting of monomers of the first set;

(cc) polymer consisting of monomers of the second set; and

(dd) water;

wherein the relative amounts of polymer (bb), polymer (cc) and water are selected to induce a phase separation;

(b) crosslinking at least some of the crosslinkable groups;

wherein step (b) is carried out after step (a).

35. The method of any one of claims 32-34, wherein the aqueous two-phase system comprises a further block copolymer as defined in claim 1.

36. The method of claim 35 wherein at least a part of the B blocks of the block copolymers comprises a target recognizing ligand, such as an antibody, peptide, protein, or carbohydrate.